ORIGINAL RESEARCH

A Comparative Assessment on Clinical characteristics and histopathological manifestations in leprosy

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ABSTRACT
Introduction: The histopathological classification's criteria are clear, accurate, and include consideration for immunological manifestations, allowing it to successfully overcome the challenges associated with leprosy diagnosis, whereas the clinical classification solely focuses on the outward appearances of the lesions. Thus this study aim was to assess the Clinical characteristics and histopathological manifestations in leprosy. **Materials and Methods:** The histopathologic analysis of each biopsy's results and the clinical diagnosis of the leprosy cases (as supplied by the department of Dermatology) were correlated. Hematoxylin and Eosin- and modified Fite–Faraco (FF)-stained slides were examined by two investigators for changes in the epidermis, dermis, presence of granulomas, lymphohistiocytic infiltrate, epithelioid cells, Langhans giant cells, nerve involvement, and presence of acid-fast bacilli (AFB). **Results:** The distribution of 139 cases on the clinicalleprosy spectrum based on Ridley-Jopling scale revealed maximum cases 64 (52.3%) in borderline group(BT{25.4}+BB{11.9}+BL{16.4}).Inpolar groups, 34 (28.8%) cases belonged to TT and 19 (14.2%) to LL.9 (6.4%)caseswereofENL,5 (3.2%) of histoid leprosy, 2(0.9%) of indeterminate and 2(0.9) was inconclusive. No cases were found of type 1 and pure neural in our study. **Conclusion:** It is advised that clinical and histological aspects be correlated for precise type and treatment to lower morbidity in leprosy patients and their families
Keywords:leprosy patients,histopathologic analysis, Skin disease

INTRODUCTION

Various clinico-pathological manifestations of leprosy arise based on the host's immunological state.[1,2] Leprosy diagnosis is based on various clinical characteristics, including a thorough evaluation of peripheral nerves and skin lesions. Leprosy diagnosis is also aided by the Ziehl-Neelsen staining technique, which demonstrates acid-fast bacilli in split skin smears. A strong histological diagnosis and the presence of bacilli in the histopathological sections are essential for a trustworthy diagnosis. While the parameters used for the histopathological classification are well defined, precise, and also account for the immunological manifestations, allowing it to successfully bridge the gaps in leprosy diagnosis, the clinical classification only recognizes the gross appearances of the lesions. Histopathology aids in precise typing and offers corroborating data for questionable cases that may be overlooked in clinical practice or epidemiological research. Histology also shows how a disease is progressing and regressing while being treated.

Mycobacterium leprae, an uncultivable infectious disease, is the cause of leprosy, a persistent granulomatous illness.[3] While the global prevalence of Hansen's disease (HD) has significantly decreased below elimination levels since the mid-1980s, new instances are still showing up in many Southeast Asian nations, most notably India and Indonesia, suggesting that the illness is still being transmitted.[4,5] Due to its clinical diversity and ability to mimic other skin diseases, it is difficult to diagnose leprosy clinically in early stages.[6]Thus,histopathological examination of skin biopsies plays a pivotal role in early diagnosis, categorization, and treatment to prevent permanent nerve damage and Grade 2 deformities.

Leprosy-related physical impairments frequently result in severe social stigma and prejudice towards patients and their families.[7-10] As a result, eliminating or combating the causing organism is essential for the

control of communicable diseases.[7,9] Leprosy can manifest as anything from a minor skin lesion to a severe illness that results in severe disability or abnormalities.[10,11] Peripheral nerves become swollen and thickened, and leprosy mostly affects the skin, resulting in sores and anesthesia.[9-11] The histopathological classification's criteria are clear, accurate, and include consideration for immunological manifestations, allowing it to successfully overcome the challenges associated with leprosy diagnosis, whereas the clinical classification solely focuses on the outward appearances of the lesions. Histopathology can confirm suspicious instances that may go unnoticed in epidemiological and clinical research. It is a useful tool for research as well as for confirming a diagnosis and its subtypes, prognosis, and an evaluation of the disease's regression in patients receiving therapy.[12]

MATERIALS AND METHODS
After providing written informed consent, all patients who met the clinical criteria for leprosy enrollment were placed in a proforma that had been pre-designed. A split skin smear and a histological examination were performed on each. The histopathologic analysis of each biopsy's results and the clinical diagnosis of the leprosy cases (as supplied by the department of Dermatology) were correlated. Hematoxylin and Eosin- and modified Fite–Faraco (FF)-stained slides were examined by two investigators for changes in the epidermis, dermis, presence of granulomas, lymphohistiocytic infiltrate, epithelioid cells, Langhans giant cells, nerve involvement, and presence of acid-fast bacilli (AFB). Cases classified as indeterminate, histoid, and neuritic leprosy were also included in the study. Clinicohistopathological correlation was done for all cases. Slit-skin smear (SSS) findings were also reviewed, whenever possible.

RESULTS
Total 139 patients were enrolled out of which 87 were males (62.5%) and 52 (37.4%) were females. Most common age group affected was 21-40 years (45.3%) followed by age group 41-60 years (25.8%) [Table 1].

Table1

Age Group(In Years)	Male	Female	Total(%)
0-20	5	4	9 (6.4)
21-40	33	30	63 (45.3)
41-60	23	13	36 (25.8)
>60	26	5	31(22.3)
Total(%)	87(62.5)	52 (37.4)	139 (100)

Out of 139 clinically diagnosed cases, 105 were undergone histopathological examination. Clinically, number of skin lesions were 1-2 in 27 cases(19.4%),3-10 in 32 cases(23%) and >10 in 80 cases (57.5%) [Table 2].

Table2

No. of skin lesions	Cases	Percentage
1-2	27	19.4
3-10	32	23
>10	80	57.5

The distribution of 139 cases on the clinical leprosy spectrum based on Ridley-Jopling scale revealed maximum cases 64 (52.3%) in borderline group(BT{25.4}+BB{11.9}+BL{16.4}).In polar groups, 34 (28.8%) cases belonged to TT and 19 (14.2%) to LL.9 (6.4%) cases were of ENL,5(3.2%) of histoid leprosy, 2(0.9%) of indeterminate and 2(0.9) was inconclusive. No cases were found of type 1 and pure neural in our study.

Maximum clinico-histopathological correlation was seen in IL (100%) followed by TT (84.6%), BL (64.3%),LL(57.4%),BT(28.2%) and minimum in BB (0%) [Table 3]. Overall concordance of diagnosis was seen 54.4% in our study.

Table3

Types	Clinical	Histopathological												%
		TT	BT	BB	BL	LL	ENL	T1	PN	I	H	U	ND	
TT	34	27	0	0	0	1	0	0	0	3	0	3	--	84.6
BT	32	3	9	0	8	0	0	1	0	1	0	0	10	27.58
BB	16	1	1	0	0	0	0	0	0	0	0	0	14	0
BL	22	0	3	0	15	0	0	0	0	1	0	0	3	64.3
LL	19	3	1	0	3	10	1	0	0	1	0	0	0	57.4
ENL	9	2	0	0	0	2	5	0	0	0	0	0	--	66.66
I	2	0	0	0	0	0	0	0	0	2	0	0	--	100
H	5	0	0	0	0	0	0	0	0	0	5	0	--	100

> TT-TUBERCULOID LEPROSY; BT-BORDERLINE TUBERCULOID; BB-MIDBORDERLINE; BL-BORDERLINE LEPROSY; LL-LEPROMATOUS LEPROSY; ENL-ERYTHEMA NODOSUM LEPROSUM; I- INDETERMINATE; H-HISTOID LEPROSY; U-UNCONCLUSIVE; ND-NOT DEFINED

DISCUSSION

The Ridley and Jopling categorization, which is mostly based on immunity but has been connected with clinical, histological, and bacteriological findings, is the most widely accepted by researchers. The classification of leprosy into five immunological subtypes—borderline lepromatous (BL), lepromatous (LL), mid borderline (BB), borderline tuberculoid (BT), and tuberculoid (TT)—was first proposed by Ridley and Jopling.Thirteen Even with such a precise classification, there were a great deal of differences between the clinical and histological characteristics in leprosy cases. The largest number of leprosy cases in the borderline group (BT {24.36} + BB {10.92} + BL {15.96}) was found in case 61 (51.26%) in the current study's clinical spectrum. Sharma et al. similarly found a similar predominance of cases in the borderline group.14 In 53.78% of the patients in the current investigation, the histological features agreed with the clinical diagnosis, which was in line with the findings of the Sharma et al. study.[14] Following the study's exclusion of ambiguous cases, patients of tuberculoid leprosy appear to pose the least challenge for categorization. Thapaet al.[15] and Dyavannanavar et al.[16] show a similar greatest percentage of concordance between clinical and histological diagnosis of tuberculoid leprosy cases in their separate studies. Thus, it is essential to correlate the histological characteristics with the clinical traits that the specific morphological lesion that is being biopsyed presents. It could be feasible to improve the association between the histology and clinical alterations if this is done carefully. There was an improved connection between clinico-histopathology and the polar groupings. Sharma et al. similarly reported a similar increase in the clinico-histopathological concordance of the lepromatous group and the tuberculoid group.[4]Lepromatous and borderline lepromatous leprosy differ very little, but tuberculoid and borderline tuberculoid leprosy frequently overlap clinically, histologically, and immunologically.

Furthermore, BI in granulomas was found to be higher on FF than that of SSS by Ridley and Jopling who opined that SSS reflected density at particular foci while sections took into account the size of the lesion along with density.[17,18]

Lepra reactions are an important cause of morbidity in leprosy patients. Erythema nodosumleprosum (ENL) (type II reaction) is an immunological complication affecting approximately 50% of the patients with LL and 10% of BB.[19] In the present study, two patients of LL presented with ENL after successful completion of MDT. Awareness of the diverse clinical features of ENL is useful for the accurate diagnosis successful management and prevention of permanent disabilities.[19]

The reasons for emergence of new cases in post elimination era, is the long incubation period of leprosy which range from few weeks to 30 years. Thus, the cases appear "hidden" and the numbers cannot go up or down suddenly.[20] Furthermore, social stigma prevents most patients from seeking medical treatment until it is too late.

Social rehabilitation becomes extremely difficult once problems set in, and nerve damage is irreversible. While India's worldwide disability rate dropped from 4.5% to 3.8% in 2014–2015, the proportion of newly diagnosed patients with Grade 2 disability (G2D) grew from 3.10% in 2010–2011 to 4.61% in 2014–2015. Leprosy is being discovered later than it should, and there may be unreported instances in the community, according to the high G2D rate among new cases.[21] Early HD diagnosis and therapy are so crucial.

Because of the variety of clinical presentations, even skilled dermatologists frequently struggle with the clinical diagnosis of early leprosy lesions. Therefore, we stressed the significance of histological investigation for early identification and treatment of HD before any disability manifests itself in all clinically suspected cases.

CONCLUSION

While the clinical symptoms of leprosy only show the morphological change brought on by underlying pathology, the histological aspects show the accurate response of the tissues. It makes sense to anticipate some discrepancy between the histological and clinical characteristics. It is advised that clinical and histological aspects be correlated for precise type and treatment to lower morbidity in leprosy patients and their families.

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